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David Harris

Randall Morck

Joel Slemrod

Bernard Yeung

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ABSTRACT

It is often claimed that multinational firms avoid taxes by shifting income from high-tax to low-tax countries. Using a five year panel of data for two hundred large U.S. manufacturing firms, we find that U.S. tax liability, as a fraction either of U.S. sales or U.S. assets, is related to the location of foreign subsidiaries in a way that is consistent with tax-motivated income shifting. Having a subsidiary in a tax haven, Ireland, or one of the "four dragon" Asian countries - all characterized by low tax rates - is associated with lower U.S. tax ratios. Having a subsidiary in a high-tax region is associated with higher U.S. tax ratios. These results suggest that U.S. manufacturing companies shift income out of high-tax countries into the U.S., and from the U.S. to low-tax countries. Such behavior certainly lowers worldwide tax liabilities for larger U.S. manufacturing companies and appears to significantly lower their U.S. tax liabilities as well.

David Harris  
School of Business Administration  
University of Michigan  
Ann Arbor, MI 48109-1234

Randall Morck  
Faculty of Business  
University of Alberta  
Edmonton, Alberta  
CANADA T6G 2R6

Joel Slemrod  
2266A Business Administration  
University of Michigan  
Ann Arbor, MI 48109-1234  
and NBER

Bernard Yeung  
7208 Business  
Administration  
University of Michigan  
Ann Arbor, MI 48109-1234

## INCOME SHIFTING IN U.S. MULTINATIONAL CORPORATIONS

by

David Harris, Randall Morck, Joel Slemrod, and Bernard Yeung

### I. INTRODUCTION.

By their very nature, multinational corporations trade goods, services, financial capital and intangible assets across national borders within their enterprise. By using artificial transfer prices in these transactions and concentrating debt financing in highly taxed subsidiaries, a multinational can shift taxable income within its group of companies to reduce its overall tax burden and to achieve other objectives such as bypassing capital controls. From a country policy perspective, such behavior can affect tax revenues and the level and location of investment and employment. From a firm policy perspective, questions arise as to the mechanics, costs, benefits, and, thus, the optimality of such behavior.

Surprisingly little evidence on income shifting based on firm-level data is available. In this paper, we present such evidence. We find that U.S. manufacturing firms with subsidiaries in low tax countries have relatively low U.S. tax payments per dollar of assets or sales. Furthermore, having a subsidiary in a high tax region is associated with higher U.S. tax payments. These results suggest that U.S. manufacturing companies do engage in this sort of income shifting.

After reviewing the limited existing empirical literature in the next section, we present our empirical framework and data in section III. In section IV we report cross-firm regression results that are consistent with the notion that multinational firms shift income from high tax locations to the U.S. and from the U.S. to low tax locations, thus reducing their overall

tax liabilities. In sections V and VI, we discuss statistical and economic issues that might affect our results. In section VII, the economic significance of our results is addressed. Section VIII concludes.

## II. REVIEW OF THE LITERATURE.

There is a substantial literature on the extent to which the internal pricing policies of multinationals are influenced by tax factors. Alworth's (1989) review of this literature suggests the importance of tax considerations, but also points to the impact of market structure, the nature of product markets and limitations on profit repatriation.

Considerable anecdotal evidence suggests that tax-motivated income shifting by U.S. multinationals occurs. Wheeler (1988) describes U.S. tax court cases where income was apparently shifted for tax reasons. In one example, in 1975 G.D. Searle had an average return on employed assets of -42.3% in the U.S. and 11% in Puerto Rico - a zero effective tax rate jurisdiction. Of course, anecdotal evidence does not establish the economy-wide prevalence of income shifting.

There have been two recent empirical attempts to uncover systematic evidence of income shifting by examining observable variables that should be affected by it. Grubert and Muttl (1991), using cross-country aggregate data on U.S. multinationals' affiliates, regress two measures of affiliate profitability in 1982 against the host country's statutory corporate income tax rate (or tax holiday rate if one is generally available). They run similar regressions on a measure of the average tax rate: the ratio of foreign taxes paid to book income of U.S. controlled corporations with positive profits. The growth of host country's G.D.P. is included as a proxy for economy-wide pre-tax profitability.

They find a significant and large negative relationship between either measure of foreign taxes and either measure of foreign affiliate profitability. In other words, firms declare more income in low tax jurisdictions. This is consistent with income shifting. The magnitude of the estimated effect is noteworthy. In their favored regression a drop in the statutory tax rate from 40% to 20% implies an increase in the ratio of after-tax profits to sales from 5.6 to 12.6 percent, and an increase in the after-tax rate of return on equity from 14.2 percent to 20.7 percent. Clearly, these results imply that a lower tax rate is associated with a higher pre-tax rate of return, and do not simply reflect a smaller slice taken by taxation out of an unchanging level of profitability.

Hines and Rice (1990) also analyze country-level aggregate data from 1982 on U.S. non-bank majority-owned foreign affiliates. They investigate the effect of host country tax rates<sup>1</sup> on the location of U.S. multinationals' pre-tax non-financial profits, pre-tax financial profits (i.e. net interest income), total profits, and factors of production. Using regression analysis, they find a negative relation between all of these variables and host country average tax rates.

The results in both Grubert and Muttl (1991) and Hines and Rice (1990) are consistent with the hypothesis that the reported income of U.S. multinationals' foreign affiliates tends to appear in countries with low corporate income tax rates. Moreover, Hines and Rice argue that the apparent success of tax haven countries in attracting taxable income is not obviously a bad thing for U.S. welfare. Because the U.S. taxes its resident multinationals on a residual basis, moving the location of their income from a high-tax foreign country to a low-tax foreign country may increase the total taxes paid that are received by the U.S. Treasury. However, to the extent

that taxable income migrates from the U.S. to a foreign country, the U.S. treasury is a clear loser. In any case, neither Grubert and Mutti nor Hines and Rice directly address the extent of income shifting between the U.S. and other countries. Both focus on income shifting between foreign affiliates. A more complete picture of income shifting by U.S. multinationals requires an assessment of income shifting to and/or from the U.S. parent. That is the issue we address in this paper.

### III. METHODOLOGY.

Our objective is to uncover systematic evidence of income shifting using firm level data. Because shifted income is by nature difficult to observe directly, we attempt to predict its impact on observable variables, a methodology not different from that in Grubert and Mutti (1991) or Hines and Rice (1990).

We start with a firm's current U.S. tax, denoted as  $T_U = \tau_U R_U$ , where  $\tau_U$  is the U.S. statutory corporate tax rate, and  $R_U$  is reported U.S. taxable income. For simplicity of exposition we assume a linear tax function.  $R_U$  can be decomposed into

$$(1) \quad R_U = Y_U - Y_{UL} + Y_{HU}$$

where  $Y_U$  is actual U.S. income,  $Y_{UL}$  is income shifted from the U.S. to subsidiaries in low tax jurisdictions and  $Y_{HU}$  is income shifted from subsidiaries in high tax regions to the U.S. Total U.S. tax liability,  $T_U = \tau_U(Y_U - Y_{UL} + Y_{HU})$ , unlike its component parts, is reported by most firms and is therefore readily observable. The relationship between  $\tau_U(Y_U - Y_{UL} + Y_{HU})$  and a firm's presence in locations with tax rates different from the U.S. tax

rate reveals information about  $Y_{UL}$  and  $Y_{HU}$ . Hence, we attempt to use regression analyses to uncover the relation between a U.S. firm's U.S. tax payment and the firm's presence in foreign locations with different tax rates.

As a starting point, we assume that the choice of where to operate is exogenous and unrelated to the income shifting decisions with which we are primarily concerned. This is meant as a simplifying assumption, not as a statement about how we think the world works. The empirical implications of it not holding are discussed in Sections VI and VII.<sup>2</sup> This assumption allows us to treat the location of foreign operations as independent variables in the following regression:

$$(2) \quad (T_U/S_U)_{ft} = g^H d_{ft}^H + g^L d_{ft}^L + bz_{ft} + c_{ft}$$

where  $T_U$  is U.S. tax liability;  $S_U$  is a scaling factor;  $f$  and  $t$  are firm and time subscripts, respectively;  $d_{ft}^H$  and  $d_{ft}^L$  are vectors of dummy variables indicating firm  $f$ 's presence in various high-tax and low-tax regions respectively in period  $t$ ;  $z_{ft}$  is a vector of control variables;  $g^H$ ,  $g^L$  and  $b$  are vectors of regression coefficients; and  $c_{ft}$  is an error term.

The hypothesis we test is that the elements of  $g^H$  are positive while those of  $g^L$  are negative. This hypothesis presumes that operating in a high-tax country induces income shifting to the United States and that operating in a low-tax country induces income shifting from the United States.

Our sample consists of 200 U.S. manufacturing firms selected randomly from the SIC 3000 industries of the Primary, Supplementary and Tertiary Industry file listing of Compustat. Compustat data from 1984 through 1988 is supplemented with data from company annual reports.<sup>3</sup>

The dependent variable is the firm's current taxes payable to the federal

government net of investment tax credits. It is retrieved from Compustat (item 63) and then verified by cross checking with annual reports and tax notes.<sup>4</sup> We drop observations where the firms' current U.S. federal tax liability is zero because firms in this situation may face different income shifting incentives from those described above.<sup>5</sup> After excluding these cases and observations with missing data, we obtain a sample of 486 firm-years that are quite evenly distributed over the five sample years.

A firm's U.S. income is likely to be roughly proportional to the size of its U.S. operations. We want to explain income shifting,  $Y_{HU} - Y_{UL}$ , using total U.S. federal taxes,  $T_U = \tau_U(Y_U - Y_{UL} + Y_{HU})$ . Dividing the latter variable by the size of U.S. operations allows us to interpret variations in the resulting ratio (after controlling for other obvious predictors of U.S. taxable income) as due to income shifting. This procedure also reduces the potential for heteroscedasticity problems. The scaling variables used, total U.S. sales and the total book value of U.S. assets, are obtained directly from financial statements. A company must report a rough geographic breakdown of its sales and assets if foreign sales or assets exceed 10% of U.S. sales or assets. If a geographical breakdown is not reported in a given year and the firm has no foreign subsidiaries at that time, its total sales and assets are treated as U.S. sales and assets. If foreign subsidiaries exist but no geographical breakdown of sales and assets is presented, we exclude the observation on the grounds of missing data.

In some specifications we include seven independent variables to control for differences in firm characteristics that may have direct or indirect effects on a firm's pre-tax profitability and tax position. They are research and development spending, advertising spending, depreciation and amortization, rental expenses, investment tax credits, interest expenses and number of



employees. The last variable is meant to capture wage expenses, which is unavailable in Compustat for over 90% of our observations. All the control variables are obtained from Compustat<sup>6</sup> and are worldwide consolidated figures.<sup>7</sup> These control variables are scaled either by the firm's worldwide sales or its worldwide assets to match the scaling factor used in the dependent variable.

All of these independent variables have a tax shield effect and should therefore be related to lower U.S. tax liabilities. However, some of them may also capture other effects that increase tax liability. Research and development spending or advertising spending may proxy for the presence of intangible assets that increase the return to foreign direct investment (Morck and Yeung, 1991a and 1991b).

Finally, in certain specifications we introduce industry dummies based on three-digit Standard Industrial Classification (S.I.C.) codes to control for inter-industry differences in profitability and tax burdens.

The independent variables that we focus on are the elements of  $d_{ft}^H$  and  $d_{ft}^L$ . They are categorical variables indicating a firm's presence in high-tax and low-tax jurisdictions. To operationalize this notion, we divide the non-U.S. world into 13 regions classified as follows:

- (i). *Regions with a statutory tax rate higher than the U.S.* consist of Canada, Japan, Australia and New Zealand, and high-tax countries in Western Europe.
- (ii). *Regions with a statutory tax rate lower than the U.S.* consist of low-tax countries in Western Europe, the "four dragon" Asian countries, and other non-communist Asian countries.
- (iii). *Extremely low tax regions* consist of Ireland and tax havens.

(iv). *Regions affected by capital controls or other political concerns* consist of South Africa and Latin America.

(v). *Others*: Africa and O.P.E.C.

Subsidiaries in communist countries are ignored both because they are very rare, and because they are subject to idiosyncratic policies on earnings repatriation.

We determine the multinational structure of each firm in each year using various issues of the *International Directory of Corporate Affiliations*. The vectors  $d_{ft}^H$  and  $d_{ft}^L$  consist of one's and zero's indicating the presence or absence of any subsidiaries in the high tax and low tax regions respectively.<sup>8</sup> For example, if a firm has two subsidiaries in Hong Kong, one in Japan, and three in England, the vectors contain one's in the three appropriate columns and zero's elsewhere.

We use indicator dummies rather than the tax rates themselves for several reasons. First, as Hines and Rice (1990) point out, calculating a representative tax rate for a country is notoriously difficult.<sup>9</sup> Second, income shifting may be motivated by reasons other than tax minimization such as risk avoidance, bypassing capital controls or reducing tariff payments. Moreover, the effect of tax differentials on income shifting depends critically on the regulatory environment. These effects lead to non-uniform relations between tax rate differentials and shifted income, and make it difficult if not impossible to devise a manageable empirical approach along these lines. By using carefully designed regional dummies, we can capture a net income shifting effect due to tax minimization and these other factors.

If the amount of income shifting depends on the size of a firm's operations in the various jurisdictions involved, our use of indicator dummies

could render our results noisy and therefore less reliable. On the other hand, if income shifting requires only the firm's presence in the various jurisdictions, our specification is preferable. Since a detailed geographic breakdown of the extent of non-U.S. operations is not available in general, the point cannot be resolved here.

In Table 1 we list the regions and their representative corporate tax rates based on *Price Waterhouse Corporate Taxes, A Worldwide Summary* (1984, 1988) and the expected signs of the regression coefficients of the regional dummy variables. The corporate tax rates are reported merely to provide a glimpse of the differences between the tax rates in these regions and the U.S. tax rate.<sup>10</sup> In general, we expect the regression coefficients of the dummies indicating a firm's presence in higher-tax regions to be positive and those indicating a firm's presence in lower-tax regions to be negative.

The extent of income shifting is affected by its cost, holding tax rate differentials constant. Hence, our explanatory variables should include measures of this cost. Income shifting is usually conducted via artificial transfer prices<sup>11</sup> that deviate from true economic prices. Caves (1986, Ch. 8, p. 246-247) argues that there are two constraints on such behavior. First, the use of artificial transfer prices and multiple books can lead to internal confusion and sub-optimality in a firm's operation. Second, income shifting is constrained by tax collectors' monitoring efforts. While the validity of the former is an empirical issue, the second constraint is undeniable.<sup>12</sup>

In dividing the world into regions, we attempt to control for differences in the cost of income shifting. We bundle countries together that have similar business climates and tax enforcement regimes, as well as similar statutory tax rates. The S.I.C. code dummies introduced to control for inter-industry differences in tax burdens may also control, to some extent,

for inter-industry differences in the cost of income shifting.

Still, substantial differences in income shifting costs might exist within industries. The presence of intangible assets may reduce the cost of income shifting. Intangible assets, by their very nature, do not have readily available arms-length prices and therefore the usual regulatory guidelines for establishing transfer prices are not easily enforceable. Furthermore, the prices applied to transferring intangibles can often be set as lump sums (i.e. patent fees) so that no wedge is driven between marginal costs and benefits related to production. Some of our independent variables capture the presence of intangible assets. Research and development spending proxies for the presence of technological expertise while advertising expenditure proxies for marketing skill.

Debt financing may also facilitate income shifting. Tax deductions relating to interest expenses can be concentrated in highly taxed subsidiaries. Thus, interest expenses may also proxy for a low cost of income shifting.

We therefore investigate the interaction effect of these measures of the cost of income shifting with the location dummies. We expect that indicators of low cost income shifting should increase the absolute values of the regression coefficients of the regional dummies.

#### IV. EMPIRICAL EVIDENCE.

Table 2 contains univariate statistics for the variables described above. The ratio of U.S. federal tax to U.S. assets has a mean of .0314 while the ratio of U.S. federal tax to U.S. sales has a mean of .0231. Both have sizable standard deviations of about 1.5 times their means. Negative values of these variables exist because of tax refunds.

In 50.6% of our observations the firm is multinational, having at least one foreign subsidiary. In 49.8% of the observations there is at least one subsidiary in high-tax European countries - the most popular location for foreign direct investment. Canada is the second most popular host country: 41.6% of the observations record at least one subsidiary there. Following Canada are Latin America (27.8%), Japan (26.1%) and Australia/New Zealand (24.5%). Among the low tax regions, the Four Dragons are the most popular (19.8%), followed by low-tax European countries (15.8%), with the non-communist Asian countries being the least popular (9.3%). Ireland (13.0%) appears to be more popular than the other tax haven countries (9.1%). The least popular location overall for subsidiaries is Africa (2.7%).

Table 3 reports unweighted average U.S. federal tax liabilities (scaled separately by U.S. assets and U.S. sales) for firms grouped by the locations of their subsidiaries. For instance, the first row reports these two values for the firms in our sample with at least one subsidiary in Canada. These first pass results generally conform to expectations. Compared to the average tax ratios of purely domestic U.S. firms (reported in the last row), the average U.S. tax ratios of firms with subsidiaries in higher-tax locations are higher while those of firms with subsidiaries in lower-tax locations are lower. The average tax ratios of firms with tax haven subsidiaries are by far the lowest. One exception to this pattern is that average tax ratios of firms with subsidiaries in low-tax European countries are higher than those of domestic firms. Note also that the average U.S. tax ratios of firms with South African subsidiaries are higher than those of domestic firms. This suggests income shifting from South Africa to the U.S.

Table 4 presents our key regression results. In regressions (4.1) through (4.4) the dependent variable is U.S. federal taxes paid per dollar of

U.S. assets; in (4.5) through (4.8) the dependent variable is U.S. federal taxes paid per dollar of U.S. sales. Even numbered regressions include three digit S.I.C. code dummies. Regressions (4.3), (4.4), (4.7) and (4.8) include the seven control variables described above.

The results are almost uniformly consistent with income shifting. The dummy variables for the three most unambiguously low-tax regions - labeled Dragon, Ireland, and Tax Havens - all have significant negative coefficients, suggesting that U.S. multinationals operating there shift income out of the U.S. to these regions. The dummy variables for the two most unambiguously high-tax regions - Japan and high-tax Europe - are positive and significant, suggesting that U.S. multinationals operating there shift income from these regions into the U.S. Furthermore, multinationals operating in South Africa have increased U.S. tax liabilities, suggesting that non-tax reasons such as avoiding capital controls or political instability may also drive income shifting.

The existence of subsidiaries in other Asian countries, Latin America, Africa, and the O.P.E.C. countries does not significantly affect U.S. tax liabilities. Multinationals operating there face conflicting incentives. On one hand, they have tax incentives to shift income from the U.S. into these regions, which generally have lower statutory tax rates than the U.S. On the other hand, multinational firms also have incentives to shift income out of these regions into the U.S. because of currency risks, political risks, capital controls, etc.

One initially surprising result is the negative coefficient for Canada, which had statutory rates comparable to but slightly higher than the U.S. rate during the sample period. However, Glenday and Mintz (1990) point out that a large and increasing proportion of Canadian firms were in surplus tax loss

situations during the early eighties - as high as 61.4% in 1984 - so their effective marginal tax rates are lower than the statutory corporate rates. The same explanation applies to Australia and New Zealand in this period. Finally, the coefficient for low-tax Europe is positive and is significant in regressions (4.1), (4.2), and (4.4). Tax rates there are lower than in the U.S. because of generous tax holidays and other provisions. This result is puzzling, and we can only speculate that firms may be so constrained in using these schemes that their effective tax rates are actually not lower than in the U.S.

As discussed above, the presence of both intangibles and debt financing may make income shifting easier. We examine this idea by introducing a cross-term between the regional dummies and a dummy indicating the presence of these cost-reducing factors. Research and development spending per dollar of total sales, or of total assets, is used to proxy for production-related intangibles. Similarly, advertising spending per dollar of total sales, or per dollar of total assets, is used to proxy for marketing related intangibles. A firm with high interest expenses per dollar of total sales or assets has more opportunities to shift income by concentrating its debt financing in highly taxed subsidiaries. To capture these effects, we create a dummy variable equal to one for observations in which any of these three variables is in the highest quartile of the whole sample, and zero otherwise.<sup>13</sup> This dummy indicates that the cost of income shifting may be low.<sup>14</sup> We repeat regressions (4.4) and (4.8) adding cross-terms between this "low cost" dummy and the thirteen regional dummies in our regression analyses. The results are reported in Table 5.

These factors do appear to facilitate income shifting. Indeed, the movement of income to the U.S. from high-tax Europe and Japan seems to rely

solely on them. The regional dummies themselves have insignificant coefficients while the cross-terms are positive and significant. Similar regression results for South Africa imply that income is shifted from there to the U.S. via these same factors. Our results also indicate that firms shift income to the U.S. from Africa, Ireland, and the Four Dragon countries (although the Four Dragon coefficient is insignificant) via these channels. The income shifting from the U.S. to Canada detected in Table 4 also appears to involve intangibles and/or debt related channels. Note, however, that these factors may play a less critical role in income shifting to tax havens. The cross-term for the tax haven dummy is insignificant in eq. 5.1.

The results in Table 5 are not, however, nearly as statistically strong as those in Table 4. The results for Australia and New Zealand, Latin America, and the low-tax European countries are not significant at all. The weakness of these results may be due to the inevitable collinearity between the cross-terms and the regional dummies themselves.

#### V. STATISTICAL ISSUES.

In this section we examine the robustness of our results, focusing on the regressions reported in Table 4, especially (4.4) and (4.8), and their statistical reliability.

First, we investigate the possibility that our results might be driven by outliers. Using regressions (4.4) and (4.8) we identify a firm as an outlier if its studentized residual is greater than 3.<sup>15</sup> There are four outliers in regression (4.4) and seven in regression (4.8).<sup>16</sup> Both regressions were repeated without the outliers. The coefficient for the Japan dummy in (4.8) becomes insignificant but is still positive. In (4.4) with no outliers, Japan remains positive and significant. Other regression results are not changed



materially. We conclude that our results are probably not driven by outliers.

There may be heteroscedasticity and missing variables problems in our regression. Heteroscedasticity could be caused by less than perfect scaling of the dependent variable or by missing variables. However, heteroscedasticity-consistent t-statistics (see White, 1980) are not materially different from the simple t-statistics we report.

Missing variables can also bias the coefficient estimates. Recall that the numerator of our dependent variable can be expressed as  $\tau_U(Y_U - Y_{UL} + Y_{HU})$  where  $Y_U$  is a firm's U.S. income, and  $Y_{UL}$  as well as  $Y_{HU}$  are shifted income. The problem of missing variables may arise if we do not adequately control for variations in  $Y_U$ . Indeed, given the simple specification of our regression equations, it is likely that we do not capture all relevant control variables.

We examine the missing variables issue by repeating regressions (4.4) and (4.8) using a fixed-effects model. In other words, we regress the deviations of firms' U.S. tax ratios from their sample period means (1984 - 1988) on the deviations of the independent variables from their respective sample period means. This procedure eliminates the impact on the dependent variable of firm-specific but time-invariant missing variables that affect the dependent variable additively.

Using this fixed-effects model, we obtain a positive coefficient for Canada, high-tax Europe, Australia/New Zealand and Latin America; and a negative coefficient for Japan, Four Dragons, Other Asian countries, low-tax Europe, Ireland, South Africa, Africa and Tax Havens.<sup>17</sup> No estimates are very significant. This is not surprising since we are suppressing much information with this technique, and because it ignores any lags between incorporation of an affiliate and the onset of income shifting. Except for Japan and Latin America, the sign of a coefficient is positive when the corresponding region's

tax rate is higher than in the U.S. and is negative when its tax rate is lower than in the U.S. These results are consistent with the hypothesis that multinational firms shift income out of high-tax countries to the U.S. and into low-tax countries from the U.S.

A subsidiary in Latin America increases U.S. tax liabilities in both the fixed-effects model and the simpler specifications reported in Table 4. This again suggests that income may be shifted out of Latin America to avoid political risks and capital controls even though tax rates there are generally lower than in the U.S. The negative sign for the Japan dummy indicates that our previous estimates of the impact of having a subsidiary in Japan on U.S. tax liability may not be robust.

The coefficients for Canada and Australia/New Zealand now have positive signs as our income shifting hypothesis predicts. This suggests that the negative effect of subsidiaries in these regions on U.S. tax liability may be due to tax losses carried forward by older subsidiaries. New subsidiaries owned by firms first entering these regions may not be in this situation and thus face the actual higher statutory tax rate.<sup>18</sup> As a consequence, these firms shift income out of these regions to the U.S.

The fixed-effects model does not completely eliminate the problem caused by not fully controlling for a firm's profits because of non-additive or time varying effects. This is not just a statistical problem but also an economic issue. We therefore defer a more complete discussion to the next section.

We conclude that the regression results reported in Table 4 do not appear to be driven by heteroscedasticity or missing variables problems. The effect of having Japanese subsidiaries on U.S. tax liabilities is not, however, very robust.

## VI. ECONOMIC ISSUES.

We now turn our attention to the economic interpretation of our results. The question we address is whether or not there are sensible economic interpretations for our findings other than income shifting.

Our dependent variable is a firm's current U.S. federal tax liability divided by either its U.S. assets or its U.S. sales. Due to repatriated income from foreign subsidiaries, this tax ratio may be higher for a multinational firm than for a domestic firm. U.S. tax laws imply that income repatriated from a subsidiary in a low tax location increases federal taxes net of foreign tax credits, while income repatriated from a subsidiary in a high tax location does not. Hence, income repatriation alone should lead to a positive, rather than negative, regression coefficient for the lower-tax regional dummies while the higher-tax regional dummies should have a non-positive impact on our dependent variable. However, we obtain negative regression coefficients for the low tax regional dummies and positive coefficients for the high tax regional dummies. Our results are thus clearly not due to income repatriation.

Our results might be driven by macroeconomic factors such as regional economic performance and changes in exchange rates. It is conceivable that such changes in the economic situation of a foreign host country might have a significant impact on the firm's U.S. profits and, thus, its U.S. taxes. To ascertain that our results are not due to transitory macro-economic changes, we repeat regressions (4.4) and (4.8) using year by year data. The results are reported in Tables 6A and 6B.

The year by year regressions generate very consistent results. The signs of the regression coefficients for the separate years are identical and are also identical to the full sample estimates except for Japan, low-tax Europe,

and Latin America. However, as should be expected given the much smaller sample sizes, the statistical significance of the coefficients is attenuated. The lack of consistency in the coefficient estimates for low-tax Europe and Latin America is also not particularly surprising given that we do not obtain significant results in the pooled sample analysis. Japan aside, our findings do not appear to be driven by transitory regional macroeconomic factors.<sup>19</sup>

Another possible problem is that there might be a relationship between firm profitability and the location of subsidiaries. If affiliate locations and actual U.S. profits are both related to unobservable differences in a firm's profitability, then the estimated coefficients of Table 4 will be biased estimates of the magnitude of income shifting made possible by multinational operation. The ideal procedure for dealing with this problem is to construct a structural model of the joint decisions of where to locate and how much income shifting to do, estimated perhaps by a two-stage least squares procedure where, in the equation for reported U.S. tax paid, actual location is replaced by a predicted location variable which is purged of the unobservable influences that may be correlated with actual U.S. parent profitability. Although ideal, this procedure is difficult, fraught with its own problems and data difficulties. It is therefore left for future research. We employ simpler techniques.

One simple approach is to repeat regressions (4.4) and (4.8) including consolidated before tax income (scaled by either worldwide total assets or worldwide sales) as an additional control variable. While this procedure is statistically problematic because it induces a correlation between the regression residual and the added explanatory variable, it nonetheless sheds light on the robustness of the coefficient estimates for the regional dummies. The regression result is that the dummy for Japan becomes insignificant in the

analog of (4.8) and negative in the analog of regression (4.4). The other coefficient estimates do not change materially and significance levels actually increase slightly.<sup>20</sup>

If a firm's profitability is related to the location of its subsidiaries, the relation should also be captured in a regression of a firm's global after-tax income on the regional dummies. Results of this procedure are reported in the left panel of Table 7. Regressions (7.1) and (7.2) explain global after-tax income using the regional dummies and control variables including industry dummies. The dependent variable in the former is scaled by worldwide assets and in the latter by worldwide sales. The dummy for Japan in (7.1) has a significant positive coefficient.<sup>21</sup> Those for Canada, Europe and South Africa are positive and insignificant. Subsidiaries in Asia, the four dragons, Ireland, Australia, Latin America, O.P.E.C. Africa and the tax havens are insignificantly related to lower U.S. taxes. (The Four Dragons borders on significance). We conclude that a relation between profitability and subsidiary location does not explain away our results.

Our results might also be capturing scale economies embedded in multinationals. An important explanation for the existence of multinational firms, the *internalization theory* (see Caves, 1986), posits that having subsidiaries in any large foreign market leads to higher returns on certain intangibles. According to this view, multinational firms possess information based intangible assets with public good properties. Technological know-how, marketing expertise, and exceptional management could be such goods. Due to well known problems stemming from the economics of information, normal markets for these goods may not exist. Because of their public good properties, these assets should be applied on as large a scale as possible to maximize firm value. The solution is to expand the firm's scale: *internalizing* markets for

these intangibles. Including R&D spending and advertising expenses (proxies for technology and marketing related intangibles respectively) as independent variables is intended in part to control for this effect. If internalization is not entirely controlled for, however, our results could be affected.

Internalization could thus imply that having generic foreign subsidiaries increases profits and therefore taxes - especially if the subsidiaries allow access to large markets. While the positive coefficients on high tax area dummies could be due in part to internalization related profits, the negative coefficients on low tax region dummies are unambiguous evidence of income shifting. Moreover, the low cost income shifting indicator variable in Table 5 also serves as an indicator of some of the assets likely to lead to internalization profits: technology and marketing ability. Internalization theory implies that the cross product terms should all be positive. Again, this is so only for high tax countries. Intangibles are associated with lower U.S. taxes when the firm has a subsidiary in a low tax region. This result is consistent with income shifting. We conclude that while our results for high tax areas may be affected by internalization, those for low tax regions unambiguously imply income shifting from the U.S. to low tax countries.

Finally, an alternative approach to testing for income shifting is to run regressions explaining total worldwide taxes. In the absence of income shifting, dummies indicating a firm's presence in high tax regions should have positive coefficients while dummies indicating a presence in low tax regions should have zero or negative coefficients depending on how much income is repatriated. Income shifting should reduce the positive coefficients of high tax region dummies. Indeed, enough should render them insignificant. Furthermore, income shifting implies that low tax region subsidiaries should be associated with a reduction in worldwide tax as does its absence. Thus

Income shifting implies insignificant coefficients for high tax regions and uninterpretable results for low tax regions. Although we feel that this is not an ideal hypothesis for statistical verification, we present the results of such regressions in the right panel of Table 7.

Regressions (7.3) and (7.4) explain global taxes using regional dummies and control variables including industry dummies. The scaling factor in (7.3) is worldwide assets and that in (7.4) is worldwide sales. The general insignificance of the high tax region dummies is consistent with income shifting. Again Japan does not fit the pattern. Also, consistent with income shifting, the coefficients of the low-tax region dummies are either negative or insignificant. We conclude that the lack of results in regressions of this form is consistent with income shifting.

In summary, our regression results are most readily interpretable as evidence for income shifting. The estimated impact of having a subsidiary in Japan on a firm's U.S. tax may, however, be due to factors other than income shifting.

## VII. ECONOMIC SIGNIFICANCE.

So far, the focus of this paper has been entirely on whether or not the pattern of signs obtained in the regression analysis is consistent with the hypothesis that multinational firms engage in income shifting. In this section, we reflect on the magnitude of the estimated coefficients and the implied economic effect. We concluded above that the various statistical and economic problems inherent in this study cannot explain away the basic result that income shifting occurs. We do not, however, deny that some of them may adversely affect the precision of our point estimates. In particular, if the scale of affiliate operations, which we are unable to control for, is related

to the magnitude of income shifting, the precision of our estimates may be diminished. We therefore must proceed into the following discussion with this caveat in mind.

A second caveat is that this analysis compares the U.S. taxes of firms with various multinational structures against those of uninnational firms. The internalization theory suggests that multinational operations enhance profitability. A multinational structure therefore *should* be related to higher U.S. taxes - due to higher profits - even in the absence of income shifting. On average as Table 3 shows, multinational firms in our sample do have higher U.S. tax liabilities than uninnational firms. The average multinational has a U.S. tax bill equal to 3.3% of its assets and 2.4% of its sales. The average uninnational's tax bill is only 3.0% of assets and 2.2% of sales. Since we use uninnational firms' taxes as our benchmark rather than what the multinationals' taxes would be absent income shifting, all of our estimates are affected by a positive bias.

We use the regression results reported in Table 4 to estimate the effect of income shifting on overall U.S. corporate tax revenues. The dot product of the vector of regression coefficients on the regional dummies with the vector of regional dummies for a firm is an estimate of the effect of income shifting on that firm's U.S. tax ratio. Multiplying this by the scaling variable gives a dollar estimate of the change in the firm's U.S. tax liability due to income shifting. Results from this calculation suggest that income shifting does reduce U.S. tax revenue. This happens even though the average tax ratios of multinationals in Table 3 are higher than those of uninnational firms. This is because multiplying through by the scaling factor reveals large dollar value tax reductions for the biggest firms in our sample. These dominate the dollar value sums. The size of the reduction in U.S. tax revenues depends on whether



regression (4.4) or (4.8) is used. The overall reduction is 3% of U.S. tax liability based on regression (4.4) and 22% based on regression (4.8). Obviously, the difference between these two estimates shows that this exercise is not very precise.<sup>22</sup>

Whatever the reduction in U.S. tax receipts, it appears to be due to income shifting by very large multinationals. Firms with subsidiaries in more than five regions show lowered U.S. tax bills. Based on (4.4), the average multinational firm with subsidiaries in more than five regions uses income shifting to reduce its U.S. taxes to 51.6% of what they would otherwise be. Based on (4.8), this falls to 50.6%. This implies that when the various control variables and industry effects are taken into account, large multinationals have lower U.S. tax bills than comparable unational firms.

In contrast, multinationals with subsidiaries in five or fewer regions show elevated U.S. tax bills. While the simple sums of the regression coefficients for the regional dummies are negative:  $-.0352$  for regression (4.4) and  $-.0215$  for (4.8); weighting the sums by the means of the regional dummies turns them positive:  $.0116$  for (4.4) and  $.0016$  for (4.8). This implies that when the various control variables and industry effects are taken into account a multinational with subsidiaries everywhere has a reduced U.S. tax ratio, while the average multinational has a higher U.S. tax ratio than a comparable unational firm.<sup>23</sup>

Although the uncertainties inherent in our methodology make estimates of the dollar value of income shifting imprecise, we can draw some qualitative conclusions about economic significance. First, income shifting probably reduces overall U.S. tax receipts. Second, this is largely due to the largest multinationals using income shifting to substantially lower their U.S. tax bills. Third, the typical multinational has a higher U.S. tax liability than

a similar uninational firm. The last finding could be due either to higher earnings stemming from internalization or to a net inflow of shifted income to the U.S. The ability of the largest multinationals to reduce their U.S. taxes is, however, most likely due to income shifting.

#### V. CONCLUSIONS.

We examine five years of data from the annual reports of two hundred U.S. manufacturing corporations. We find that U.S. tax liability, as a fraction either of U.S. sales or U.S. assets, is related to the location of foreign subsidiaries in a way that is consistent with tax-motivated income shifting. Having a subsidiary in a tax haven, Ireland, or one of the "Four Dragon" Asian countries (all jurisdictions with low tax rates) is associated with lower U.S. tax ratios. Having a subsidiary in a high-tax region is associated with higher U.S. tax ratios. These results suggest that U.S. manufacturing companies are able to shift income out of high-tax countries into the U.S., and from the U.S. to low-tax countries. This behavior reduces U.S. taxes substantially only for firms with an extensive multinational structure. For multinational firms as a whole, income shifting leads to a moderate reduction in aggregate U.S. tax payments. Finally, our results support the idea that multinational firms conduct income shifting for non-tax related purposes, such as avoiding capital controls and reducing political risks.

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Table 1: Regions, their Mean Statutory Corporate Tax Rates and the Expected Signs of Regression Coefficients for Dummy Variables Indicating Subsidiaries there.

Region	Mean Statutory Corp. Tax Rate <sup>1</sup>		Comparison to the US rate	Expected Sign
	1984	1988		
Canada	47%	41%	higher	+
Japan	50%	50%	higher	+
Four dragons <sup>2</sup>	30%	26%	lower	-
Rest of Asia	48%	49%	higher	-? <sup>3</sup>
Low-tax Western Europe <sup>4</sup>	31%	29%	lower	-
High-tax Western Europe	49%	47%	higher	+
Ireland <sup>5</sup>	50%	50%	lower	-
Australia/New Zealand	48%	47%	higher	+
Latin America	38%	39%	lower	? <sup>6</sup>
South Africa	46%	50%	higher	+
Africa	43%	43%	lower	? <sup>6</sup>
Tax havens <sup>7</sup>	22%	21%	lower	-
O.P.E.C.	47%	47%	lower	? <sup>6</sup>
United States	46%	34%		

<sup>1</sup> These are average corporate tax rates based on *Price Waterhouse Corporate Taxes: A Worldwide Summary* (1984, 1988). See footnote 10 for details.

<sup>2</sup> Hong Kong, South Korea, Singapore, and Taiwan. Tax holidays are available in all except Hong Kong, so statutory rates overstate the tax burden.

<sup>3</sup> India and Pakistan skew the mean upward. Most countries here have lower rates than the U.S.

<sup>4</sup> Switzerland, Luxembourg, and Malta. Tax holidays are not factored into the rate reported.

<sup>5</sup> A rate of 0% applies if the firm qualifies for a tax holiday.

<sup>6</sup> While the tax differentials for these regions appear to be negative, these regions are well known to have significant political risks or capital controls. Hence, the sign for the regression coefficient of these regions is uncertain.

<sup>7</sup> Tax havens include Andorra, Antigua, Bermuda, Bahamas, Barbados, British Virgin Islands, Cayman Islands, the Channel Islands, Cyprus, Gibraltar, Grenada, Kiribati, Liechtenstein, Netherlands Antilles, other Caribbean, St. Kitts & Nevis, St. Vincent, and Vanuatu. Substantial tax holidays are available so statutory rates greatly overstate the actual tax burden.

Table 2: Descriptive Statistics

<i>Variables</i>	<i>Sample</i>	<i>Mean</i>	<i>Std Dev</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Dependent Variables</i>					
US Tax / US Assets	475	0.0314	0.0445	-0.1673	0.2799
US Tax / US Sales	486	0.0231	0.0347	-0.2212	0.1922
<i>Multinational Structure Dummies</i>					
Multinational dummy	486	0.5062	0.5005	0.0000	1.0000
Canada	486	0.4156	0.4923	0.0000	1.0000
Japan	486	0.2613	0.4398	0.0000	1.0000
Four Dragons	486	0.1975	0.2985	0.0000	1.0000
Asia	486	0.0926	0.2902	0.0000	1.0000
Low Tax Europe	486	0.1584	0.3655	0.0000	1.0000
High Tax Europe	486	0.4979	0.5005	0.0000	1.0000
Ireland	486	0.1296	0.3362	0.0000	1.0000
Australia/New Zealand	486	0.2449	0.4304	0.0000	1.0000
Latin America	486	0.2778	0.4484	0.0000	1.0000
South Africa	486	0.0967	0.2959	0.0000	1.0000
Africa	486	0.0267	0.1615	0.0000	1.0000
O.P.E.C.	486	0.0576	0.2333	0.0000	1.0000
Tax Havens	486	0.0906	0.2873	0.0000	1.0000
<i>Control Variables Scaled by Worldwide Sales</i>					
R&D/Sales	486	0.0342	0.0387	0.0000	0.1804
Advertising/Sales	486	0.0137	0.0263	0.0000	0.1705
Depreciation/Sales	486	0.0382	0.0222	0.0030	0.1372
Employees/Sales	480	0.0116	0.0045	0.0027	0.0315
Rent/Sales	486	0.0132	0.0116	0.0000	0.0690
I.T.C./Sales	486	0.0019	0.0035	0.0000	0.0338
Interest Expenses/Sales	486	0.0182	0.0173	0.0000	0.1256
<i>Control Variables Scaled by Worldwide Assets</i>					
R&D/Assets	475	0.0381	0.0388	0.0000	0.1659
Advertising/Assets	475	0.0193	0.0391	0.0000	0.2949
Depreciation/Assets	475	0.0436	0.0188	0.0093	0.1407
Employees/Assets	469	0.0146	0.0073	0.0023	0.0625
Rent/Assets	475	0.0162	0.0149	0.0000	0.0841
I.T.C./Assets	475	0.0022	0.0034	0.0000	0.0226
Interest/Assets	475	0.0210	0.0175	0.0000	0.1396

The multinational firm indicator and regional dummies are zero or one. Their means are the fraction of firms that are multinational and the fraction of firms that have at least one subsidiary in the indicated region. The countries included in each region are listed in Table 1.

Table 3: Unweighted Average U. S. Federal Tax per Dollar of U. S. Assets and per Dollar of U. S. Sales by Location of Foreign Subsidiaries.<sup>1</sup>

<i>Location of Subsidiary</i>	<i>US Taxes US Assets</i>	<i>US Taxes US Sales</i>
Canada	0.03493	0.02271
Japan	0.03658	0.02784
Four Dragons	0.02812	0.01768
Asia	0.02807	0.01894
Low Tax Europe	0.03733	0.02476
High Tax Europe	0.03308	0.02392
Ireland	0.02751	0.01756
Australia/New Zealand	0.03204	0.02102
Latin America	0.03502	0.02171
South Africa	0.04574	0.02782
Africa	0.02289	0.01211
O.P.E.C.	0.01832	0.01109
Tax Havens	0.01278	0.00947
All Multinationals <sup>2</sup>	0.03300	0.02401
Purely Domestic firms <sup>3</sup>	0.02991	0.02232

<sup>1</sup> Note that a firm with several subsidiaries may be included in more than one group.

<sup>2</sup> Grand means for firms with any foreign subsidiary anywhere.

<sup>3</sup> Firms without any foreign subsidiaries.

Table 4: O.L.S. Regressions Explaining U.S. Federal Taxes Scaled by U.S. Assets or U.S. Sales with Regional Dummies and Control variables.

	US Federal Tax per \$ of US Assets				US Federal Tax per \$ of US Sales			
	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)	(4.6)	(4.7)	(4.8)
Canada	.0031 (0.36)	-.0147 (1.53)	.0013 (.15)	-.0107 (1.17)	-.0096 (1.49)	-.0215 (3.04)	-.0072 (1.19)	-.0173 (2.66)
Japan*	.0161 <sup>a1</sup> (2.53)	.0152 <sup>b1</sup> (2.21)	.0113 <sup>b1</sup> (1.82)	.0083 (1.22)	.0184 <sup>a1</sup> (3.76)	.0169 <sup>a1</sup> (3.18)	.0117 <sup>a1</sup> (2.50)	.0100 <sup>b1</sup> (1.95)
Dragon*	-.0090 <sup>c1</sup> (1.33)	-.0139 <sup>b1</sup> (1.78)	-.0139 <sup>b1</sup> (2.14)	-.0218 <sup>a1</sup> (2.88)	-.0102 <sup>b1</sup> (1.96)	-.0193 <sup>a1</sup> (3.26)	-.0126 <sup>a1</sup> (2.62)	-.0216 <sup>a1</sup> (3.91)
Asia	.0011 (0.11)	-.0005 (0.05)	-.0019 (0.21)	.0028 (0.26)	.0055 (0.74)	.0017 (0.19)	.0080 (1.16)	.0029 (0.37)
LT Eur.	.0129 <sup>c</sup> (1.85)	.0094 (1.23)	.0167 <sup>b</sup> (2.37)	.0153 <sup>b</sup> (2.02)	.0082 (1.52)	.0024 (0.41)	.0024 (0.46)	-.0008 (0.13)
HT Eur*	-.0017 <sup>d</sup> (0.23)	.0130 <sup>c1</sup> (1.44)	.0047 <sup>d</sup> (0.65)	.0259 <sup>a</sup> (2.96)	.0084 (1.49)	.0195 <sup>a1</sup> (2.97)	.0102 <sup>b1</sup> (1.91)	.0255 <sup>a1</sup> (4.10)
Ire.*	-.0135 <sup>b1</sup> (1.84)	-.0109 <sup>c1</sup> (1.32)	-.0141 <sup>b1</sup> (2.01)	-.0145 <sup>a1</sup> (1.81)	-.0116 <sup>b1</sup> (2.05)	-.0155 <sup>a1</sup> (2.42)	-.0143 <sup>a1</sup> (2.72)	-.0186 <sup>a1</sup> (3.10)
Aus./NZ	-.0110 (1.43)	-.0089 (1.12)	-.0161 <sup>b</sup> (2.16)	-.0144 <sup>c</sup> (1.88)	-.0067 (1.12)	-.0077 (1.25)	-.0059 (1.06)	-.0050 (0.86)
L. Amer.	.0059 (0.85)	.0101 (1.39)	.0051 (0.75)	.0070 (1.00)	-.0005 (0.09)	.0035 (0.64)	-.0024 (0.48)	.0011 (0.21)
S. Afr.*	.0344 <sup>a1</sup> (3.71)	.0318 <sup>a1</sup> (3.11)	.0363 <sup>a1</sup> (4.12)	.0307 <sup>a1</sup> (3.15)	.0207 <sup>a1</sup> (2.87)	.0277 <sup>a1</sup> (3.46)	.0222 <sup>a1</sup> (3.33)	.0271 <sup>a1</sup> (3.68)
Africa	-.0179 (1.15)	-.0308 (1.70)	-.0140 (0.94)	-.0383 <sup>b</sup> (2.22)	-.0110 (0.90)	-.0062 (0.44)	-.0136 (1.20)	-.0106 (0.81)
OPEC	-.0068 (0.69)	.0006 (0.05)	.0090 (0.93)	.0136 (1.08)	-.0060 (0.77)	.0021 (0.21)	-.0002 (0.03)	.0039 (0.41)
Havens*	-.0340 <sup>a1</sup> (3.67)	-.0439 <sup>a1</sup> (4.06)	-.0315 <sup>a1</sup> (3.54)	-.0391 <sup>a1</sup> (3.71)	-.0244 <sup>a1</sup> (3.38)	-.0286 <sup>a1</sup> (3.44)	-.0177 <sup>a1</sup> (2.63)	-.0180 <sup>a1</sup> (2.21)
R&D			.0018 (0.03)	.0032 (0.04)			.1475 <sup>a</sup> (2.67)	.1162 <sup>c</sup> (1.74)
Adv.			.1815 <sup>a</sup> (3.45)	.1748 <sup>a</sup> (3.00)			-.0313 (0.53)	-.1267 <sup>c</sup> (1.88)
Deprec.			-.2649 <sup>b</sup> (2.31)	-.3217 <sup>b</sup> (2.55)			.0173 (0.20)	-.0128 (0.13)
Empl.			-.2880 (1.01)	.2521 (0.73)			-1.165 <sup>a</sup> (3.59)	-.8221 <sup>b</sup> (2.01)
Rent			-.0836 (0.51)	-.4234 (2.32)			-.4655 <sup>a</sup> (3.08)	-.7086 <sup>a</sup> (4.11)
I.T.C.			.2134 (0.34)	-.1083 (0.18)			.9114 <sup>b</sup> (1.99)	.5847 (1.28)
Interest			-.7471 <sup>a</sup> (5.94)	-.6694 <sup>a</sup> (5.10)			-.5767 <sup>a</sup> (5.93)	-.5786 <sup>a</sup> (5.50)
Intercept	.0299 <sup>a</sup> (10.8)		.0580 <sup>a</sup> (8.39)		.0224 <sup>a</sup> (10.4)		.0461 <sup>a</sup> (9.24)	
SIC dummies	no	yes	no	yes	no	yes	no	yes
Sample	475	475	469	469	486	486	480	480
R <sup>2</sup>	.0867	.2587	.2041	.3605	.0814	.2487	.2459	.3944

(continued on next page)



Notes to Table 4

Numbers in brackets are t-ratios.

Control variables are scaled by worldwide total assets in (4.1) through (4.4) and by worldwide total sales in (4.5) through (4.8).

\* regression coefficients are significant and consistent with hypothesis.

<sup>a</sup>, <sup>b</sup> and <sup>c</sup> significant at 1%, 5% and 10%, respectively.

<sup>a1</sup>, <sup>b1</sup> and <sup>c1</sup> significant at 1%, 5% and 10% respectively in one-tailed tests.

<sup>d</sup> High-tax Europe is significant in (4.1) and (4.3) if firms with subsidiaries in only one region are excluded.

Table 5: O.L.S Regression of Federal Tax Rates on Regional Dummies, Cross-term indicating Low Cost Income Shifting Channels and Control Variables.

	US Fed. Tax per \$ of US Assets (5.1)		US Fed. Tax per \$ of US Sales (5.2)	
	Dummy	Cross-term <sup>1</sup>	Dummy	Cross-term <sup>1</sup>
Canada	.0071 (0.39)	-.0255 (1.23)	.0038 (0.29)	-.0284 <sup>c</sup> (1.91)
Japan*	-.0199 (0.87)	.0352 <sup>c1</sup> (1.48)	-.0138 (0.98)	.0312 <sup>a1</sup> (2.14)
Four Dragons*	-.0083 (0.52)	-.0117 (0.67)	-.0143 (1.15)	-.0092 (0.68)
Rest of Asia	.0546 <sup>a</sup> (2.69)	-.0654 <sup>a1</sup> (2.93)	.0117 (0.85)	-.0156 (0.95)
Low Tax Europe	.0224 (1.21)	-.0107 (0.54)	.0027 (0.20)	-.0049 (0.34)
High Tax Europe*	-.0063 (0.43)	.0348 <sup>b1</sup> (2.11)	.0112 (1.11)	.0144 (1.29)
Ireland*	.0094 (0.35)	-.0274 (0.99)	.0012 (0.09)	-.0245 <sup>c1</sup> (1.60)
Australia/N.Z.	-.0120 (0.56)	.0193 (0.85)	-.0094 (0.58)	.0164 (0.95)
Latin America	.0036 (0.25)	-.0075 (0.47)	-.0029 (0.25)	-.0028 (0.21)
South Africa*	-.0139 (0.45)	.0454 <sup>b1</sup> (1.38)	.0100 (0.67)	.0206 (1.22)
Africa*	-.0168 (0.64)	-.0797 <sup>b1</sup> (2.27)	-.0084 (0.42)	-.0257 (0.93)
O.P.E.C.	-.1634 <sup>a</sup> (4.12)	.1668 <sup>a</sup> (4.39)	-.0276 (1.20)	.0359 (1.56)
Tax Havens*	-.0394 <sup>b1</sup> (1.78)	-.0123 (0.51)	-.0025 (0.13)	-.0170 (0.87)
Control Variables		yes		yes
SIC Code Dummies		yes		yes
Sample Size		469		480
R <sup>2</sup>		.4695		.4304

Numbers in brackets are t-ratios.

\* results are consistent with hypothesis.

<sup>1</sup> regional dummy x dummy indicating low cost income shifting channel.

a, b and c significant at 1%, 5% and 10%, respectively.

a1, b1 and c1 significant at 1%, 5% and 10% respectively in one-tailed tests.

**Table 6A: Year by year O.L.S. Regressions of U.S. Federal Tax / U.S. Assets on Regional Dummies and Control variables for 1984 through 1988.**

	<i>U.S. Federal Tax / U.S. Assets</i>				
	(84)	(85)	(86)	(87)	(88)
Canada	-.0616 <sup>c</sup> (1.99)	-.0119 (0.34)	.0004 (0.01)	-.0113 (0.44)	-.0103 (0.54)
Japan	-.0018 (0.10)	.0193 (0.76)	-.0148 (0.73)	.0111 (0.63)	.0043 (0.29)
Four Dragons*	-.0421 <sup>b1</sup> (1.82)	-.0274 (0.97)	-.0241 (1.06)	-.0220 (1.11)	-.0058 (0.35)
Rest of Asia	.0036 (0.11)	.0063 (0.17)	.0163 (0.59)	-.0017 (0.06)	.0091 (0.34)
Low Tax Europe	.0137 (0.73)	.0336 (1.03)	.0110 (0.46)	.0270 (1.28)	.0094 (0.55)
High Tax Europe*	.0469 <sup>b1</sup> (1.82)	.0311 (0.92)	.0386 (1.51)	.0207 (0.87)	.0253 <sup>c1</sup> (1.47)
Ireland*	-.0158 (0.76)	-.0337 (1.21)	-.0354 <sup>c1</sup> (1.36)	-.0158 (0.74)	-.0091 (0.53)
Australia/New Zealand	-.0099 (0.46)	-.0540 <sup>c</sup> (1.95)	-.0156 (0.64)	-.0118 (0.57)	-.0175 (1.08)
Latin America*	.0354 <sup>c</sup> (1.75)	.0023 (0.10)	-.0023 (0.91)	.0088 (0.43)	.0051 (0.30)
South Africa*	.0581 <sup>b1</sup> (2.01)	.0626 <sup>b1</sup> (1.87)	.0372 (1.22)	.0438 <sup>c1</sup> (1.60)	.0125 (0.42)
Africa*	-.0223 (0.41)	-.0364 (0.59)	-.0865 <sup>c1</sup> (1.64)	-.0483 (1.10)	-.0514 (1.42)
O.P.E.C.	.0399 (0.83)	.0069 (0.11)	.0113 (0.31)	.0144 (0.49)	.0359 (1.31)
Tax Havens*	-.0452 <sup>c1</sup> (1.53)	-.0344 (0.81)	-.0257 (0.72)	-.0307 (1.07)	-.0404 <sup>c1</sup> (1.58)
Control Variables	yes	yes	yes	yes	yes
SIC code dummies	yes	yes	yes	yes	yes
Sample size	97	92	93	93	94
R <sup>2</sup>	.6530	.5873	.5887	.5985	.5616

Numbers in brackets are t-ratios.

\* Sign of coefficient is consistent with hypothesis in all years.

a, b and c significant at 1%, 5% and 10%, respectively.

a1, b1 and c1 significant at 1%, 5% and 10% respectively in one-tailed tests.

Table 6B: Year by year O.L.S. Regressions of U.S. Federal Tax / U.S. Sales on Regional Dummies and Control variables for 1984 through 1988.

	U.S. Federal Tax / U.S. Sales				
	(84)	(85)	(86)	(87)	(88)
Canada	-.0737 <sup>a</sup> (2.89)	-.0165 (0.64)	-.0193 (1.03)	-.0224 (1.54)	-.0091 (0.95)
Japan	.0172 (1.09)	.0209 (1.12)	.0040 (0.27)	.0042 (0.38)	-.0048 (0.57)
Four Dragons*	-.0303 <sup>c1</sup> (1.52)	-.0259 <sup>c1</sup> (1.28)	-.0215 (1.26)	-.0137 (1.17)	-.0210 <sup>a1</sup> (2.51)
Rest of Asia	.0130 (0.44)	-.0140 (0.52)	.0128 (0.60)	.0050 (0.27)	.0194 (1.32)
Low Tax Europe	-.0173 (1.13)	-.0147 (0.61)	-.0002 (0.01)	.0097 (0.72)	.0033 (0.32)
High Tax Europe*	.0495 <sup>b1</sup> (2.31)	.0292 (1.24)	.0248 <sup>c1</sup> (1.35)	.0259 <sup>b1</sup> (1.93)	.0252 <sup>a1</sup> (2.85)
Ireland*	-.0070 (0.38)	-.0142 (0.67)	-.0357 <sup>b1</sup> (1.78)	-.0236 <sup>b1</sup> (1.79)	-.0079 (0.83)
Australia/New Zealand	.0023 (0.12)	-.0235 (1.14)	-.0098 (0.55)	-.0032 (0.26)	-.0072 (0.81)
Latin America	.0310 <sup>c</sup> (1.82)	-.0011 (0.07)	-.0028 (0.19)	-.0020 (0.17)	-.0054 (0.57)
South Africa*	.0446 <sup>b1</sup> (1.76)	.0451 <sup>b1</sup> (1.83)	.0376 <sup>c1</sup> (1.61)	.0327 <sup>b1</sup> (1.95)	.0089 (0.52)
Africa*	-.0249 (0.53)	-.0058 (0.12)	-.0294 (0.75)	-.0202 (0.75)	-.0236 (1.15)
O.P.E.C.	.0310 (0.75)	.0114 (0.24)	.0032 (0.12)	-.0072 (0.40)	.0099 (0.64)
Tax Havens*	-.0283 (1.11)	-.0196 (0.59)	-.0303 (1.16)	-.0058 (0.32)	-.0137 (0.94)
Control Variables	yes	yes	yes	yes	yes
SIC code dummies	yes	yes	yes	yes	yes
Sample size	99	93	94	95	99
R <sup>2</sup>	.6796	.5726	.5728	.6918	.7163

Numbers in brackets are t-ratios.

\* Sign of coefficient is consistent with hypothesis in all years.

a, b and c significant at 1%, 5% and 10%, respectively.

a1, b1 and c1 significant at 1%, 5% and 10% respectively in one-tailed tests.

Table 7: Regressions of Global After Tax Income and Global Taxes on Regional Dummies and Control variables.

	<u>global income</u> <u>assets</u>	<u>global income</u> <u>sales</u>	<u>global tax</u> <u>assets</u>	<u>global tax</u> <u>sales</u>
	(7.1)	(7.2)	(7.3)	(7.4)
Canada	.0103 (1.19)	-.0034 (0.36)	-.0051 (0.83)	-.0064 (0.98)
Japan	.0209 (2.13)	.0149 (1.37)	.0163 (2.36)	.0130 (1.76)
Four Dragons	-.0171 (1.66)	-.0124 (1.10)	.0054 (0.75)	.0105 (1.37)
Rest of Asia	-.0074 (0.48)	-.0040 (0.24)	.0018 (0.17)	-.0020 (0.17)
Low tax Europe	.0170 (1.58)	.0136 (1.12)	.0027 (0.35)	-.0013 (0.16)
High tax Europe	.0056 (0.61)	.0159 (1.55)	-.0002 (0.03)	-.0012 (0.18)
Ireland	-.0166 (1.36)	-.0204 (1.51)	-.0127 (1.48)	-.0197 (2.16)
Australia/N.Z.	-.0043 (0.38)	.0051 (0.41)	.0048 (0.60)	.0076 (0.90)
Latin America	-.0049 (0.54)	-.0077 (0.76)	.0094 (1.46)	.0134 (1.95)
South Africa	.0065 (0.43)	.0202 (1.21)	.0040 (0.38)	.0081 (0.72)
Rest of Africa	-.0105 (0.37)	-.0102 (0.32)	-.0442 (2.20)	-.0377 (1.77)
O.P.E.C.	-.0015 (0.09)	-.0113 (0.60)	-.0146 (1.21)	-.0145 (1.13)
Tax Havens	-.0112 (0.81)	-.0001 (0.01)	-.0231 (2.37)	-.0152 (1.46)
Control Variables	yes	yes	yes	yes
S.I.C. codes	yes	yes	yes	yes
Sample size	475	469	475	469
R <sup>2</sup>	.3244	.3023	.2882	.2523

numbers in brackets are t-ratios.

Control variables are scaled by worldwide total assets in (7.1) and (7.2), and by worldwide total sales in (7.3) and (7.4).

a, b, and c significant at 1%, 5% and 10 % respectively.

#### Footnotes

<sup>1</sup>They define the average tax rate as the lesser of the benchmark survey tax rate and the statutory rate. For some tax haven countries where these data are unavailable, they obtain the tax rate from the *Economist's Tax Havens and their Uses*.

<sup>2</sup>Our empirical investigation focuses on the relationship between income shifting and the locations of a firm's foreign affiliates. Investment decisions are based mainly on very long run considerations such as expected future input costs, the availability of infrastructure, non-tax government policies and expected product market growth. There are long lags in formulating and implementing investment plans and there are also large adjustment costs to altering on-going investment strategies. Thus, decisions about the location of foreign direct investment are arguably only tangentially related to income shifting opportunities. Our future research is aimed at exploring this issue.

<sup>3</sup>Data obtained from annual reports are dated according to the Compustat dating convention as described in the *Industrial Compustat User's Manual* published by Standard and Poor's Compustat Services, Englewood, Colorado 80112.

<sup>4</sup>Raw Compustat data and cross checked data generate similar results. Note that current U.S. federal taxes as reported in a company's annual report is an estimate of the actual tax liability made at the time the report is published (usually January). Dworin (1985) finds that this estimate is generally greater than the actual tax payment. The principal causes of this discrepancy are the inclusion of a "cushion" in the financial tax provision for possible audit adjustments and differences in the extent of consolidation in financial reports versus I.R.S. tax reports. To the extent that the audit cushion is larger for firms that are more aggressive tax minimizers, it should reduce our chances of finding evidence of income shifting. Consolidation for financial reporting is more extensive than for IRS tax reporting. Important affiliates included in the former but not the latter are foreign affiliates with U.S. income, domestic international sales corporations (D.I.S.C.'s), Puerto Rican corporations and some financial affiliates such as insurance, investment, and real estate companies. Given our objective, the more extensive consolidation for financial reports is appropriate. Note that provisions for future repatriated income in financial statements are considered deferrals and thus are not included in estimated current tax expenses.

<sup>5</sup>In this panel, 68% of the firm-years have positive U.S. federal taxes, 13% have negative U.S. federal taxes, and 19% have zero U.S. federal tax. Our results for the full sample, for the subsample without observations with zero U.S. federal tax, and for the subsample including only observations with positive U.S. federal taxes are similar. The results for the subsample that includes only observations with negative U.S. federal taxes are similar to those we report but are less significant.

<sup>6</sup>These variables are assumed to be zero if the Compustat reports 0.0001 (unavailable observation) or 0.0008 (insignificant observation) and all other financial data are available. The number of employees is considered missing if Compustat reports 0.0001 or 0.0008.

<sup>7</sup>Geographic breakdowns of these variables are not available.

<sup>8</sup>We count only subsidiaries in measuring a firm's presence in overseas locations. Branches and representative offices are not included. For tax purposes, branch income is consolidated with that of U.S. operations. Thus, income shifting among branches is likely much less effective, if not totally ineffective, in reducing a firm's tax burden. The definition of a subsidiary is that in the *International Directory of Corporate Affiliations* (1985/1986): "A chartered business whose shares are owned, in whole or in part, by another company. The level of ownership is generally greater than 50%."

<sup>9</sup>"No single measure of the corporate income tax rate can accurately capture the precise difference in tax burdens corporations face in different countries. For one thing the complexity of tax codes (including different provisions for tax deductions, depreciation rules, loss carry forwards and carry backs, and nonstandard income concepts) precludes the possibility of distilling a well-defined tax rate for each country. In addition a single tax rate cannot capture industry and firm specific tax holidays or other features." Hines and Rice (1990), page 42.



<sup>10</sup>We calculate the corporate tax rates using data from "Price Waterhouse Corporate Taxes: A Worldwide Summary." For the countries in each region, we collect the corporate tax rate applicable to foreign-owned subsidiaries. The tax rates chosen apply to income arising from the manufacture and sale of goods in the host country. If progressive tax rates are provided, the highest rate is used. If there are dual rates on repatriated and retained earnings, we record the lower rate. State and local income taxes are included in the reported rate, net of federal tax deductions allowable. If more than one state tax rate is provided, a simple average is used. V.A.T.'s, tariffs, and withholding taxes on dividends, royalties and rents are excluded. Also excluded are tax holiday rates and other specialty tax rates.

<sup>11</sup>These transfer prices include accounting prices used for intra-company exchanges of goods as well as services from intangibles, tangibles, and financial assets.

<sup>12</sup>Wilson (1991), in a case study of nine firms with sophisticated tax planning procedures, finds that some firms do use multiple sets of books and that tax collectors' efforts to restrict transfer pricing have been stepped up in recent years.

<sup>13</sup>We experimented with other definitions of this interactive dummy variable and obtained results similar to those reported below.

<sup>14</sup>Sixty nine percent of the multinational firms in our sample are classified as having low cost in income shifting while 63% of those in the full sample are classified as such.

<sup>15</sup>In (4.8), one of the identified outliers actually has a studentized residual of 2.975 and a Cook's D statistic of 0.084. No non-outliers have Cook's D statistics greater than 0.025, and all but two have Cook's D's below 0.02.

<sup>16</sup>Two of the four outliers in regression (4.4) are multinational firms and four out of the seven outliers in regression (4.8) are multinational firms. For the multinational firms, the prediction errors are all positive. Of the five uninnational firms, three have positive prediction errors.

<sup>17</sup>A dummy for O.P.E.C. is not included because no firms have changed their presence there.

<sup>18</sup>This is certainly true of greenfield expansions. However, Canadian tax law allows the transfer of some tax losses under some circumstances following acquisitions.

<sup>19</sup>Because our data includes years before and after the Tax Reform Act of 1986 (TRA86), it is also potentially instructive to look at any differences in the estimated relationships across the two periods. TRA86 lowered the corporate statutory tax rate from 46% to 40% in 1987 and 34% in 1988 and thereafter. This change by itself should increase the amount of income shifting from high-tax countries into the U.S. and decrease the amount of income shifting from the U.S. to low-tax countries. TRA86 also increased the likelihood that a firm will be in excess foreign tax credit status. This development increases the payoff to income shifting, because it reduces the likelihood that changes in taxes paid to foreign governments will trigger offsetting changes in the amount of foreign tax credit granted by the U.S. government. In the aggregate, then, following TRA86 there should be more income shifted out of high tax foreign countries while the change in income shifted into low tax countries is less certain. No such pattern is apparent in Table 6B. However, two further considerations make the story more complicated. First, TRA86 also restricted the ability to average foreign taxes in the calculation of foreign tax credits. Second, because of the gradual phase-in of the tax rates, there were important incentives to change the timing of income realizations. This renders data from 1987 and 1988 somewhat suspect as an indicator of steady-state behavior and makes 1986 data suspect as a sample of typical pre-TRA86 behavior. For a more detailed discussion of TRA86, see Slemrod (1990). Harris (1991) analyzes the effect of TRA86 on income shifting.

<sup>20</sup>The procedure discussed in the text does not eliminate the potential simultaneity bias, but instead changes the nature of the bias and, under certain assumptions, changes its sign. Thus the fact that the qualitative nature of the results is not altered by including the worldwide profitability variable implies that they are not an artifact of this sort of simultaneity bias.

<sup>21</sup>Given the alleged entry barriers in Japan, it may not be surprising that successfully entering that market is correlated with high earnings.

<sup>22</sup>The individual coefficients of specific regional dummies can also be interpreted. As an example, the estimated coefficient from regression (4.4) on the regional dummy for Ireland is -0.0145. This implies, *ceteris paribus*, that having an affiliate in Ireland is associated with a reduction in the ratio of U.S. income to U.S. assets of .0352 (.0145 divided by the average U.S. tax rate of .412). For a multinational firm with U.S. assets equal to five times its Irish assets, the implied jump in the Irish income to assets ratio is 0.176. The aggregate income to assets ratio in 1982 for U.S. affiliates in Ireland was 0.23. This rather large estimate is consistent with the qualitative findings of the previous studies discussed in Section II. Of course these estimates are for an average firm. For a multinational with a very small presence in Ireland, this technique probably produces far too high an estimate of the actual amount of income shifting. Peter Wilson has suggested that firms with Irish or tax haven subsidiaries may be more likely to have Puerto Rican subsidiaries as well. Our data sources do not include Puerto Rican operations in the lists of foreign subsidiaries. It is therefore possible that the Ireland and tax haven dummies are picking up the effects of income shifting to Puerto Rico. Jim Hines has suggested that firms that are more aggressive in saving U.S. taxes are more likely to have subsidiaries in Ireland and other tax havens; part of the large negative effect of these regional dummies may be explained by this.

<sup>23</sup>Regressions (7.3) and (7.4) generate similar results. Morck and Yeung (1991a and 1991b) find that multinational structure and expansion increase firm value only if intangibles are present. Since firms with intangibles may be able to engage in income shifting more easily, a naïve interpretation of their results is that the increased value is due to reduced taxes. However, the average multinational pays more worldwide taxes than does a similar uninationaional firm, presumably because it is more profitable. The increased value must therefore be due to factors such as the internalization of foreign markets, rather than reduced taxes. Reduced taxes might explain increased value only for the largest multinationals.